

# Nuclear Resonant Scattering on Earth Materials using Synchrotron Radiation

February 12-13, 2005

Argonne National Laboratory • Argonne, Illinois

**Nuclear Resonant Scattering (NRS)** techniques provide the Earth and planetary science community with opportunities for new and exciting results on the properties of materials at high pressure and temperature conditions. Such NRS experiments have become possible due to the characteristics of third generation synchrotron radiation sources such as the Advanced Photon Source. NRS techniques fall into two broad areas:

**Synchrotron Mössbauer Spectroscopy (SMS)** provides information on magnetic properties and valence state of iron in minerals and high-pressure phases. It is also sensitive to solid-melt transitions.

**Nuclear Resonant Inelastic X-ray Scattering (NRIXS)** provides information on vibrational and elastic properties, such as the phonon density of states and sound velocities.

Both methods are in many ways ideally or even uniquely suited for addressing a number of important geophysical questions.

## Workshop Goals

This two-day workshop is organized within the COMPRES infrastructure development initiative which is aimed at creating state-of-the-art NRS techniques for characterizing the properties of materials under the high-P-T conditions of planetary interiors. In particular, we intend to:

- Provide a basic introduction of NRS to the Earth science community;
- Define the state-of-art of NRS especially at high pressure;
- Discuss the applications to important geophysical problems;
- Develop productive collaborations;
- Address common experimental issues confronting users.

A day of scientific presentations, will include tutorials on NRS and examples of NRS experiments under high pressure and high temperature. It will be followed by the opportunity to conduct NRS experiments “hands on” at sector 3-ID of the Advanced Photon Source. Knowledge of NRS or synchrotron radiation techniques is not required to benefit from the participation in this meeting. The program of this workshop is specifically designed for scientists and graduate students in the Earth-science community who have no prior experience with NRS or synchrotron radiation.

## Location and Time

The workshop will take place at the Advanced Photon Source on February 12-13, 2005. Accommodations are arranged at the Argonne Guest House. Please note that Argonne National Laboratory requires a security check for visitors which may take up to two months, particularly for citizens of countries that are considered “sensitive countries” under DOE regulations.

**It is important to register as early as possible.**

## Support

Meals during the workshop and accommodation expenses for participants staying at the Argonne Guest House will be fully covered. Also a limited amount of travel support will be available on request.

## Organizing Committee

- **Dr. Wolfgang Sturhahn**, Physicist and Group Leader, *Advanced Photon Source, Argonne National Laboratory*, [sturhahn@anl.gov](mailto:sturhahn@anl.gov)
- **Prof. Jay D. Bass**, Professor of Geology and Materials Sciences, *Geology Department, University of Illinois at Urbana-Champaign*, [jaybass@uiuc.edu](mailto:jaybass@uiuc.edu)
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